

poll. These bright colors frequently "go dark" in the process of being photographed, so dark as to be quite beyond us in our painting unless we radically change the negative and print.

We have had good success in thus doctoring an occasional negative. In a Redpoll portrait, for example, we opaqued the red cap so completely in the negative that in the print it appeared a glaring, impossible, altogether flat white. But by applying proper tints we gradually brought this cap down to the proper shade of red, with the result that we now have a slide that is interesting and that shows a real Redpoll, not a Redpoll with a sooty crown.

Some persons will brand this doctoring of negatives as "Nature Faking". And, to be sure, that is just what it is. The whole business of photography is a nature-faking business. What we get in our final, unretouched print often is a far cry from what we actually saw at the time our photograph was taken. What we want in our final slide is the best likeness we can achieve of our subject. The light has played tricks on us. The camera has failed miserably in catching shadow-color. Parts of our subject are out of focus. Our task is to build up, as best we can, images of the subjects that will do them justice.

LABORATORY OF ORNITHOLOGY, CORNELL UNIVERSITY, ITHACA, N.Y.

DEPARTMENT OF ZOOLOGY, CARLETON COLLEGE, NORTHFIELD, MINN.

CENTRAL WISCONSIN CRANE STUDY

BY F. N. HAMERSTROM, JR.

Sandhill Cranes (*Grus canadensis tabida*) are among Wisconsin's rarest breeding birds (Henika, Scott). The fact that a few cranes persist is due more to the tolerance of a few landowners than to any direct action toward maintaining or improving crane habitat. Although they are legally protected, protection alone has not been enough to swing the balance in their favor.

The chief reason for this casual treatment of so rare a bird seems to be lack of definite information upon which to base a program of active conservation. To make a start toward the needed factual base, in 1936 and 1937 a brief crane study was made as a part of the research program of the Central Wisconsin Game Project. Necedah.* The purpose of the study was to map the position of the crane ranges on and close to the Project and to learn something of the character of

*Farm Security Administration, Project LD-WI-5.

Acknowledgments: Field assistance—James Blake, Burns Carter, J. R. Goodlad, Oswald Mattson, and Millard Truax, members of the Project game staff; and Frances Hamerstrom. Review of this paper—Mr. W. T. Cox, Regional Forester-Biologist, Region II, F. S. A., and Professor Aldo Leopold, University of Wisconsin.

these places as a first step toward developing methods for increasing the population; in other words, crane management. The term "range" is used for areas in which fairly definite numbers of cranes are found fairly regularly during the breeding season. This paper is based upon a study of seven ranges which have been used for at least the last five years, and in most cases considerably longer. Their locations and the number of cranes in each are given in Fig. 25, which also includes four other places frequented by cranes. One of these, the Potter unit, is probably a definite range; a second, the Hog Island unit, may be a range newly established in 1937. The Daly and Norway Ridge units are probably feeding grounds for known ranges nearby.

DESCRIPTION OF THE COUNTRY

The area covered lies in the southwest part of Wisconsin's central plain. Soils are of two major types, sand and peat, both acid and lacking in essential plant foods, with a high incidence of frost in the peat areas. True prairie, at least in post-glacial times, has never been present in the area in significant quantity (Thomson), but once came within a few miles of its western side (Schorger).

Land industries are general farming, low-grade dairy farming, cranberry growing, and seasonal harvesting of sphagnum moss, marsh hay, and blueberries. About 100,000 acres near Neccdah are being developed for wildlife by the F. S. A., following the removal and resettling of the resident farmers.

Except for a few bluffs and sand ridges, the country appears to be flat. The plain is actually a mixture of low marsh basins and slightly higher sand islands, undulations in the former bed of glacial Lake Wisconsin. The whole pattern is cut through by many drainage ditches. The basins, single or in southeast running chains, once held timbered swamps, bogs, and open marshes of from twenty to several thousands of acres. White and red pine grew on the sand islands and ridges, but were stripped clean during the lumbering days.

Repeated fires followed artificial drainage and destroyed most of the peat, as well as the forest duff on the sandy uplands. Aspen and willow have taken much of the burned peat, and poorly formed jack pines and scrub oaks have replaced the white and red pine.

The larger peat areas were more resistant to drainage, and to this fact, apparently, most of the remaining crane habitat can be traced. There a few tamarack-spruce swamps and leatherleaf-labrador tea bogs, small samples of original conditions, have persisted; but even in these places the ditchers were partly successful, and the swamps and

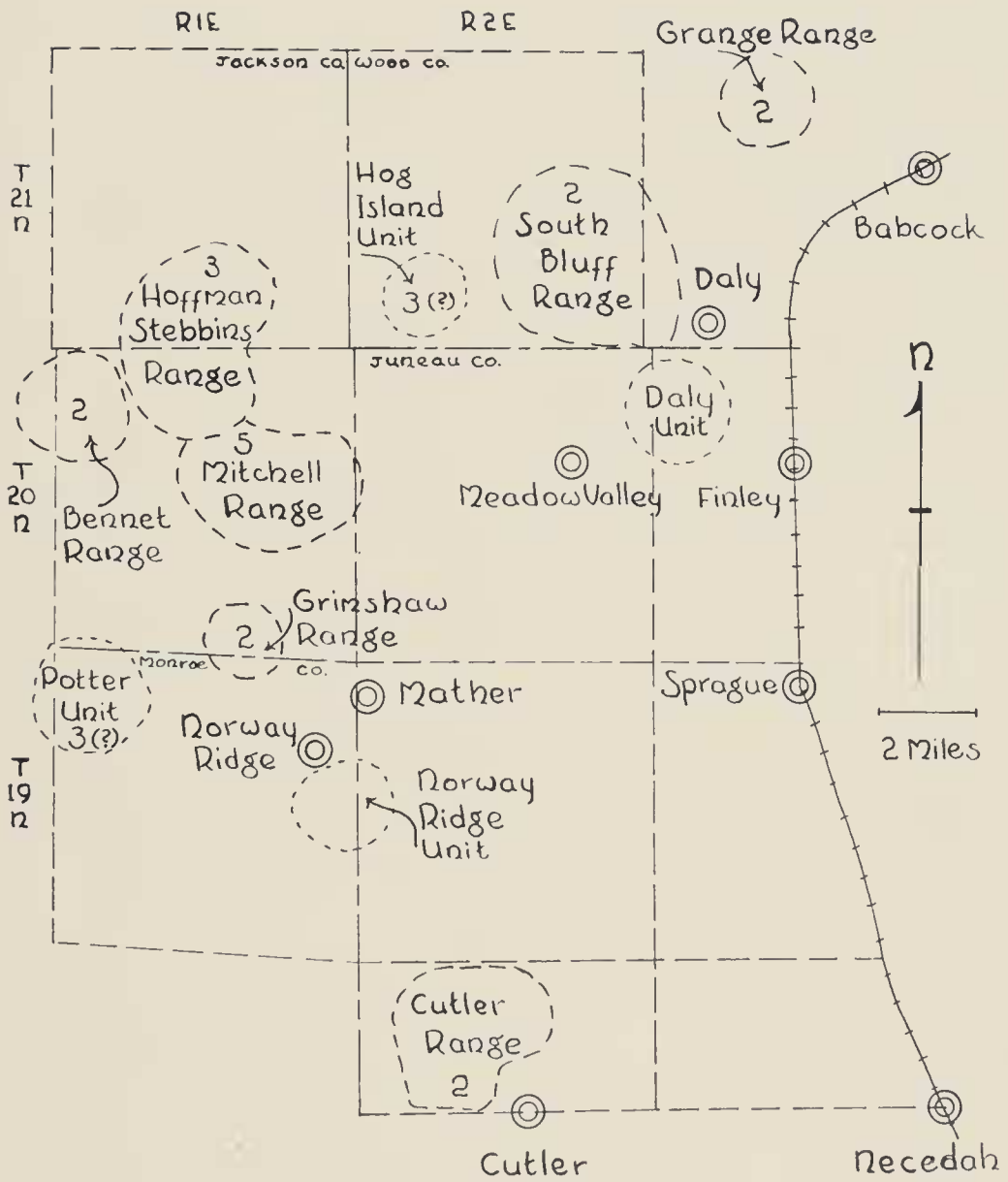


FIG. 25. Crane ranges, and the number of birds in each, in the study area.

bogs are associated with grass marshes and vast tracts of even-aged aspen, indicators of lowered water levels. Cover types, on the whole, occur in large blocks. Open water is confined to drainage ditches, a few breaks in the floating bog, and the impounded waters of the cranberrymen's reservoirs, around which over half of the ranges studied were centered. Fig. 26 shows the land forms of one such large peat area, containing three ranges.

One exception to this general condition was found: the Cutler range. It is an area of small marshes and sand islands and is more typical of the region as a whole than are the relatively few large peat areas.

WHAT IS CRANE HABITAT?

We do not know exactly what the basic condition necessary for cranes may be, but it seems logical to assume that elements common to a number of ranges may include it or may produce it through their joint action. One element common to all of the seven ranges studied is the presence of areas of shallow water, over forty acres in size. These may be impounded waters—cranberry reservoirs, the ponds on the Cutler fur farm—or areas in which artificial drainage has been a partial failure. Cover types were floating sedge bogs, shallow grass, sedge and cat-tail marshes, and flooded aspen flats. Deep open water seems to be definitely less attractive.

A second common element is isolation. Although the cranes often feed in cultivated fields, and have some contact with the activity around cranberry marshes, there is usually a nearby area of a section or more in which the presence of humans is uncommon, except for such seasonal work as haying or mowing.

The invasion of marshes by aspen and willow, as already pointed out by Leopold, has a bearing upon both of these elements. Such invasion increases isolation, since hay and moss are no longer produced, but does away with the *openness* of the country, so uniformly associated with cranes in the literature. If an aspen flat is an acceptable substitute for open marsh, well and good. On the other hand, the presence of water may figure so prominently in the crane ranges because it keeps down brush invasion.

The large size of the ranges is one of their most striking characteristics. The smallest was somewhat over a thousand acres, the largest almost five thousand. In no case, however, was it all wild land. Cultivated fields, cranberry developments, and in one case a fur farm, occupied part of the range, although in each instance taking up less than ten per cent of the total. It would seem that the ranges are

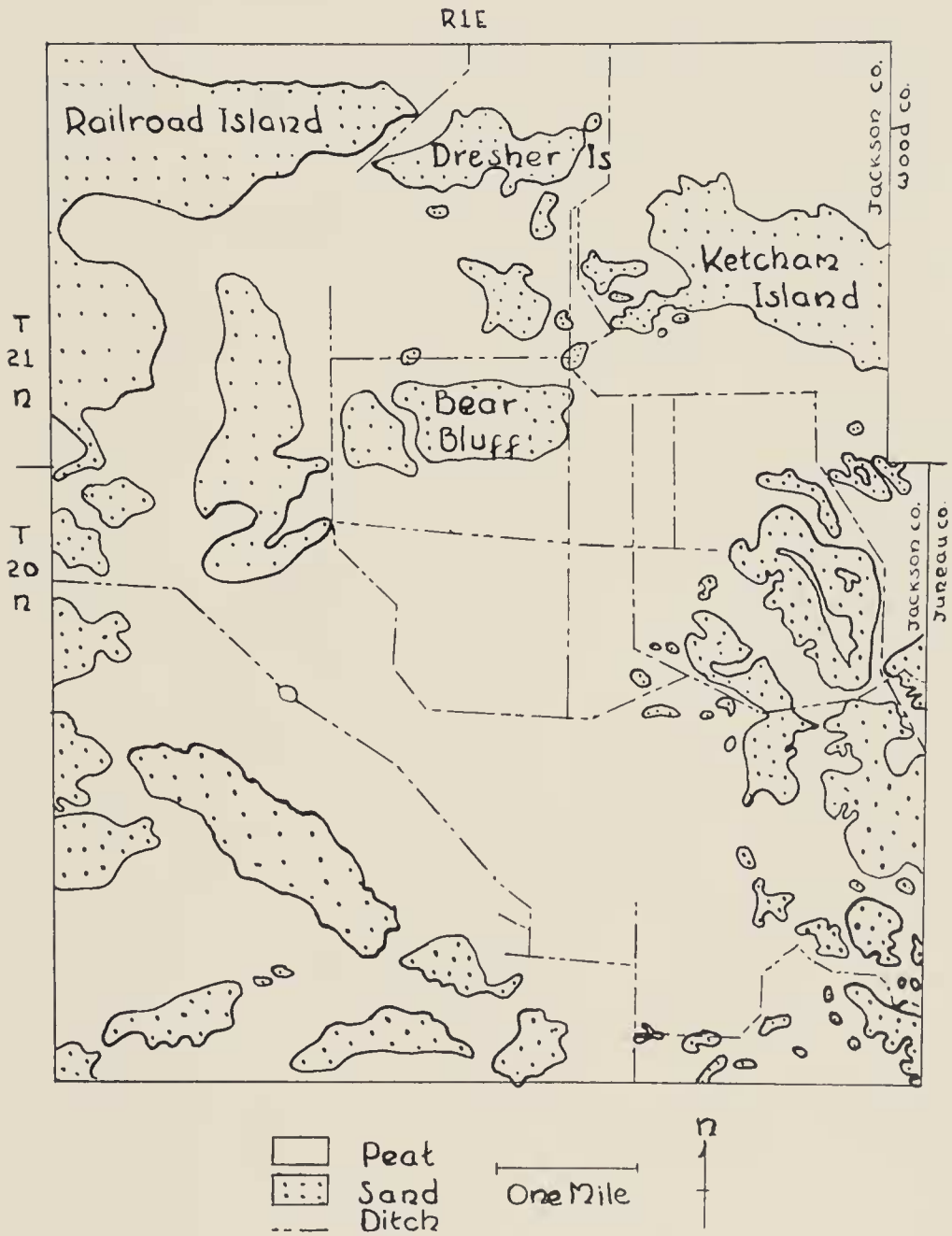


FIG. 26. Land forms in the northwest part of the study area.

made up of two parts: a relatively small nucleus in which particularly rigid standards must be met, and a much larger bordering zone which may be enroached upon to a far greater extent by unfavorable circumstances. Water areas, single if large or multiple if small, constitute the nucleus, while the bordering zone is the associated aspen flat-grass marsh cover.

The inclusion of a variety of cover types within a range, so characteristic of this nucleus and bordering zone arrangement, may or may not be an advantage. Long flights are made over aspen flats to objectives a mile or more away, suggesting that the great size of the ranges may be accounted for by the assumption that they include a scattering of favored spots within a vast matrix of unsuitable cover. Only twice were we able to find crane sign along the line of flight, in both cases in sedge openings similar to the nuclear portion of the range. Whether or not varied cover is an advantage, it is to be seen in the background of photographs of crane nests in Minnesota (Roberts) and in Europe (Berg). Berg, indeed, is of the opinion that edges of brush or dead timber are preferred nesting sites. An understanding of the exact relationship between these two parts of the range is probably the fundamental problem in crane management.

In all but one of the ranges studied—in fact, over the state as a whole (Scott)—all of these elements of crane range may be reduced to one common denominator: peat. Shallow water areas in large isolated tracts of open marsh and bog, swamp and aspen flat, occur in this region only in peat basins. It is not clear whether peat basins are preferred or are used because only they provide the size and isolation necessary for crane habitat. By their large size and limited economic productivity, areas of this sort are more suited to state control than are richer agricultural lands.

A final element common to all of the ranges is the presence of uplands, the possible importance of which as rearing grounds is mentioned in a later paragraph.

GENERAL LIFE HISTORY

There are about eighteen cranes in the ranges shown on Fig. 25, and about three more in the suspected Potter unit. Probably not more than one pair of breeders is present in each range, although the odd numbers in several ranges indicate additional non-breeders.

Dates of first arrival in the Hoffman-Stebbins range were: 1936, during an early warm spell in late March; 1937, April 9. The latter date is probably the more typical.

From the time of their first appearance until early summer, cranes in the Hoffman-Stebbins range were often seen in cultivated fields between early morning and ten o'clock, and again from about three until dusk. They were apt to be on the floating sedge meadow in the cranberry reservoir between eleven and three, although they often flew to the aspen flat, tamarack swamp, and floating bog country southwest of Bear Bluff instead. In early spring, one finds pairs or larger groups; as the season advances one is more apt to see single birds. In the other ranges, which were less intensively studied, the same general relationships seemed to hold.

Several of the cranberry men have seen cranes dance on the marshes, and Mr. Griffen saw (May 12, 1937) what was undoubtedly the dance on a food patch on a high sand ridge near his house.

A nest containing two eggs was found by Goodlad and Carter on May 18, 1936, in the Hoffman-Stebbins range. By June 3 one egg had hatched, apparently the day before, and by the 5th both had hatched. One of the juvenals was in hiding about twelve feet away, the other ran about through the sedges, keeping within about twenty yards of the nest. The nest, a flat platform of sedges about twenty-four inches across and one and one-half inches high, had been built on a floating sedge meadow. Two clumps of four-foot willows gave slight concealment on two sides, while the other two sides permitted unobstructed vision across the three or four hundred acre sedge meadow. The floating sedge mat was thoroughly soaked, although the nearest open water was a ditch 100 feet away. Aspen and willow flats and sand ridges covered with pines and oaks surround the reservoir.

In the same year, a nest was found by Mr. Cleveland Grant in the South Bluff range. One of the adults had been killed on the nest, Mr. Grant thought by a coyote. This nest was also on a floating bog, in a rather open marsh. These two Wisconsin nesting places are essentially similar to three described by Walkinshaw in Michigan, and nine of the ten reported by Holt from the Kissimmee Prairie in Florida.

A nest was found some years ago in the Cutler range and I am told that cranes nest regularly on the Bennett marsh. Mr. Grimshaw noticed that the two cranes on his marsh behaved as though crippled when disturbed during the 1937 breeding season, and he regarded as juvenals two which remained for a time after the others had gone in 1936. It would seem, then, that nearly all of the ranges examined were actually breeding areas.

During the rearing period, cranes were very inconspicuous. It is probably during this time that the factor of solitude becomes particu-

larly important, for the birds practically drop out of sight. Except for young at the nest, reports of juvenals were seldom heard. Knute Olson, of Mather, told me that when he was surveying about twenty years ago he came upon two juvenals still unable to fly, although fairly large in size, in the marsh toward the southeast end of Hog Island. At that time the place was even less accessible than now, for there was much more water. If this basin, which is about four thousand acres in size, was a typical rearing ground it is not surprising that cranes are rarely seen during the rearing period. Whether they move deeper into the marshes with their colts or take them into the wooded uplands, as do their European relatives (Sieber), I can not say. If, indeed, the crane has taken to the marshes and swamps not from choice but from necessity, a dry ground stage in the development of the young is to be expected.

From late August until the southward migration the fall-gathered cranes, in a fresh grey plumage, again spend much of their time in the grainfields. Up to sixteen birds were seen in the Hoffman-Stebbins range in 1936, and Mr. Stebbins has seen as many as twenty in past years. Several of the marshes in Adams County, about thirty miles to the east, are concentration points for flocks of eighty to one hundred cranes, known to be migrants. From this disparity of numbers, it seems plain that the study area is not on the main migration route through Wisconsin, and that the birds which gather in the Hoffman-Stebbins range are of local origin. The same situation seems to hold in the spring, for while large temporary concentrations are seen in Adams County, there are no such spring stopping places in the area covered by this study.

The autumn flock was much more loosely organized than the small bands seen in spring, and often split into several parts. These may have been definite entities, such as family groups. Daily movements were more wide-spread, perhaps to prepare the juvenals for the long flight to come. The area south and west of Bear Bluff was much more frequently visited, and a greater part of it was included within the flight lines.

One of the first freezes in 1936, which came during the week of October 20, marked the end of their stay for most of the cranes. Two remained in the Grimshaw range until November 8, when they too left.

Marshes, except perhaps during the rearing period, seem to be the usual night roosting places. On one occasion, three cranes were seen at dusk on a sedge meadow at the edge of open water, and were watched until darkness had fallen. Conversely, observations begun before day-

light twice indicated that daily activity began in the marshes. We have many reports of cranes flying to the marshes at dusk and out of the marshes in the early morning.

The presence of cranes in cultivated grainfields has already been touched upon, but not sufficiently emphasized. Observations on feeding birds indicate that grains—particularly buckwheat, although corn and oats were also taken—are a large part of the diet in spring, early summer, and autumn.

Many of the autumn droppings were stained bright purple. From crane sign found along an elderberry thicket, Goodlad and Carter were of the opinion that these berries produced the color. According to their observations, grasshoppers and crickets were eaten at the same season. To test the value of food remains in the droppings as an index to food habits, thirty fresh fecal passages, distinctly purple in color, were collected from a buckwheat field on September 26, 1936. Lack of equipment made a thorough analysis impossible. With a hand lens the hard seeds of huckleberry (*Gaylussacia baccata*) and blueberry (*Vaccinium* sp.), fragments of the legs and wings of grasshoppers (*Melanoplus femur-rubrum*) and of the legs and elytra of a few unidentified beetles (*Coleoptera*), with a few bits of unidentified twigs, were separated from the buckwheat hulls and seed coats which made up 81.9 grams of the 82.8 grams of air-dried material.

Soft plant and animal matter would probably be unrecognizable, but dropping analyses might well be used to good advantage to supplement direct observation of feeding birds.

CONCLUSIONS

Our findings may be related to the purposes of the Project in four ways:

(1) The minimum unit of land for crane management is about 1500 acres in a single block.

(2) Large areas of deep peat are most suited to crane management and should be reserved for that purpose. There is one such area within the Project, which was used by cranes before it was drained. It is being partially reflooded. Certain of the smaller reflooded marshes, particularly where linked together in a series, may also offer possibilities.

(3) On the blocks reserved for crane management the present grid-iron pattern of roads, heritage of a C. C. C. invasion, must be broken up. Gates placed on bridges crossing the drainage ditches and destruction of side trails by flooding would prevent general automobile travel without seriously interfering with fire patrol. If this be not

done, the Project will defeat one of its own original purposes; namely, crane conservation.

(4) Food patches of corn or buckwheat should be maintained in occupied or prospective ranges to replace the grain fields lost through the removal of farmers.

LITERATURE

- Berg, Bengt. 1930. To Africa with the migratory birds. The Knickerbocker Press, G. P. Putnam's Sons, N. Y.
- Henika, Franklin S. 1936. Sandhill Cranes in Wisconsin and other Lake States. Proc. North Amer. Wildlife Conf., Committee Print, U. S. Government Printing Office, Washington, D. C., pp. 644-645.
- Holt, E. G., 1930. Nesting of the Sandhill Crane in Florida. Wilson Bulletin, Vol. XLV, No. 3, pp. 163-184.
- Leopold, Aldo. 1937. Marshland elegy. American Forests, October.
- Roberts, Thomas S. 1932. The birds of Minnesota. Univ. of Minn. Press, Vol. I.
- Schorger, A. W. 1937. The range of the bison in Wisconsin. Trans. Wis. Acad. Sci., Arts, and Letters, Vol. 30, pp. 117-130.
- Scott, Walter E. Unpublished mss. "The Sandhill Crane in Wisconsin."
- Sieber, Hans. 1932. Beobachtungen über die Biologie des Kranichs (*Megalornis gr. grus*). Beiträge zur fortpflanzungsbiologie der Vögel, Jahrgang 8, Nr. 4/5, pp. 134-143.
- Thomson, John W. 1937. Dynamics of some prairie plants in Juncau County, Wisconsin. Unpublished master's thesis, University of Wisconsin.
- Walkinshaw, L. H. 1933. The Sandhill Crane in a Michigan marsh. Wilson Bulletin, Vol. XLV, No. 3, pp. 99-106.

DIVISION OF GAME MANAGEMENT, UNIVERSITY OF WISCONSIN,
MADISON, WISCONSIN.

A LIFE HISTORY STUDY OF THE YELLOW-BREASTED CHAT

BY GEORGE A. PETRIDES

In an effort to increase the photographic record, as well as to add to our knowledge of the life-history of the Yellow-breasted Chat (*Icteria v. virens*), two nests of this species were studied during the nesting season of 1937. This enterprise was carried out under the direction of Dr. Paul Bartsch of The George Washington University, whose gracious loan of photographic equipment made possible the pictures here reproduced.

Photographs of the chat are extremely rare. To the best of my knowledge, the two pictures taken by Dr. A. A. Allen are the only ones, until this date, that have appeared in the literature.¹ This species is the shyest of the warblers and although often heard it is but seldom seen. Once the bird realizes that it is observed it becomes silent and moves about only furtively. The parents are silent about the nest and the discovery of the nesting site is accomplished only by systematic search. Many investigators emphasize the extremely timid nature of the chat and some have stated that the parents will leave their eggs